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Special Report

Polaris Fleet Ballistic Missile

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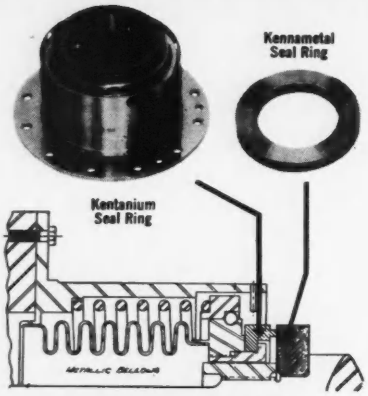

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EDITORIAL
by Martin Caidin

MOON BUSINESS

After four previous, frustrating attempts, the United States has finally launched its "Me Too" instrument payload past the moon. The shot, performed for NASA by the Army, deserves all the laudits that have been heaped upon the accomplished fact.

Unfortunately, accompanying the shower of praise has been a distressingly naive attitude that not only have we matched what the Russians have accomplished in their Mechta, but we have literally leaped ahead of Russian ability to hurl large payloads to the moon, and beyond.

It is difficult to understand the thinking of American editors, and of many writers, who elaborate upon this point. I was astonished to see in a leading New York paper a copyrighted article by Willy Ley which pointed out that we now had established a definite superiority over Russian abilities – and this conclusion was drawn on the basis that Pioneer III achieved greater speed than had the massive Russian rocket. Speed, not payload, wrote Mr. Ley, was the critical factor in such an attempt.

This is also the thinking that prevails in many other editorials. Snide remarks that our Pioneer III was better equipped, and gained much more information, than did Mechta, have been rife since the tiny Army probe vanished into the solar system.

It is well past time to stress some accuracy in this field. First, to compare Pioneer III and Mechta as two vehicles basically identical is to ignore reality. The difference between 13.4 pounds payload, and that of 796 pounds, is so obvious as not to require further elaboration. But as strange as it may seem, this is the case.

This variation in payload proves the obvious lie to the statement given the American public that Pioneer III was better equipped to probe the space environment, and gained more information. This is stooping to an incredible low in a nation lying to itself. If Pioneer III could accomplish its mission with 13.4 pounds, then Mechta could do this and a dozen times more with ease because of nearly a half-ton of instruments and batteries.

To return to Mr. Ley's amazing claim that speed is only what matters... any engineer can picture the 796 pounds of instruments reduced to perhaps 200 pounds, and the weight of the instruments replaced with a rocket approximately the size of the Vanguard third stage – resulting in thousands of miles per hour greater velocity.

Pioneer III was a great step forward for the United States. But it could not match the Russian achievement in payload. The Soviet rocket passed within 4,660 miles of the moon. Pioneer III had to come within 20,000 miles to accomplish the bulk of its mission – it passed at a distance of 37,000 miles.

To place these two space probes on an equal basis is to ignore reality. Perhaps this move will fool the American people – but it won't impress the Russians at all.

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A COMMENT IS IN ORDER . . .

Following this introductory comment is a special *Progress Report* on the United States Navy's Fleet Ballistic Missile **Polaris.** We wish to distinguish our editorial comment from the factual sheet, which was prepared with the assistance and cooperation of USN. This separation is necessary because our comments do not necessarily reflect official stand, and it would be less than fair not to avoid *"quoting out of context."*

It is DATA's belief that much information on the **Polaris** program has been presented to the American public with some heavy sugar coating. We do NOT deprecate the need for this missile system; indeed, its greatest value lies in the fact that the Polaris-launching submarine has every chance of being in a position to hurl its missiles into Russian targets even though the continental United States might be smouldering after a devastating ICBM barrage.

However, there are too many bland statements made in behalf of the Polaris which simply do not sustain themselves under closer scrutiny. Too many Navy officials have spread the belief that, for example, the Polaris is instant retaliatory capability *"tomorrow."* What is *"tomorrow"?* Is it 1959, or 1961, or even 1962? In effects of numbers that mean anything – *no.* The Polaris is a missile that cannot possibly be used in *effective number* for several years to come.

Then there is the semantics attached to the magic word of *effective number.* The layman is convinced that if there are in existence several years from now fifteen Polaris submarines, each with ten missiles, then we will have the capability to retaliate instantly with 150 nuclear-tipped missiles.

But is this really so? The answer, unhappily, is no. It just isn't true. Working on the premise of fifteen completed submarines, there will never be these fifteen in a position to carry out a massive attack. Even the nuclear submarine must return to base for replenishment of supplies. Some submarines will either be in port, or moving out to their assigned *"combat launch areas"*. All in all, less than fifteen submarines at any rate.

Of the remainder. . . can all of these be immediately and most efficiently utilized as retaliatory power? Statistics and charts may indicate so, but hard facts do not. First, the Polaris program is in difficulty. The original requirements of 1,500-mile range, if everything we have gathered about the system are true, has been dropped from anywhere to 800 to 1,200 miles – and this reduces the efficiency of the system which has been championed so loudly.

Then. . . what about the missiles themselves? The Polaris carries, in comparison to the ICBM, a low-yield warhead. In comparison to that carried by the manned bomber, a very low-yield warhead. The onlooker to the program should distinguish at once the difference in kiloton or even megaton yield. One Polaris on target does not an ICBM make.

There is the problem of accuracy. Is the Polaris accurate? If so, **how** accurate? The Navy says that *"Accuracy is expected to be very good."*

What constitutes *"very good"? Everything* here depends upon your own definition of accuracy. A mile from target? Five miles? Ten miles?

However accurate may be the Polaris, you won't get much argument from missile engineers that Polaris accuracy simply won't measure up to what can be obtained from the liquid-fueled IRBM or the ICBM. Solids simply aren't in the same class. The liquid-fueled IRBM like the Thor has its gimballed engine for directional control, as well as the vernier motors for more precise maneuvering into the desired trajectory at specific velocity. The Atlas and Titan are far more sophisticated. One reason for justifying the Minuteman, beyond instant *(and we use that term advisedly)* firing capability is that it is expected to be fired in barrage numbers – to make up for lesser accuracy.

So no matter what number of missiles fired – lack of accuracy is going to reduce effective missile-on-target results.

Then, finally, comes the biggest bugaboo of all – *reliability.* A great deal may be said for solids over liquids in reference to reliability *(we'll ignore the appalling rate of failure in the test and development program, because Polaris is strictly in its infancy),* but where has the record been so astonishing for solids with major systems? Polaris isn't the Honest John or even the Sergeant – it's a critical missile to be fired from a submarine, and the number aboard is sorely limited. Then there's the matter of reliability *in flight* – a successful launch is a long way from a completed mission. We recall only too painfully how the third Air Force lunar probe worked perfectly – until the *"absolutely reliable"* third stage failed to fire. It was a solid, remember?

Finally – our own summation. Polaris is essentially a weapon of vengeance. No one can deny this. The key to having the Polaris is that it is supposed to be available for hitting Russian targets after what may be so successful an attack against the continental U.S. that home-based weapons are destroyed – and we can't strike back. In that event, is there a war left to win? What will Polaris do in that event?

Can it pick up if the Strategic Air Command is virtually destroyed? Can it replace all the bases anticipated now for Titan and Atlas? Can it accomplish the strategic-mission destruction of both Russian industry and the Russian ability to continue strategic attack?

We doubt anyone would claim this to be so – for there just won't be that many submarines around to perform but a measured fraction of such an assignment. This relegation of Polaris to its specific post-attack role, perhaps in straight vengeance fashion, doesn't dismiss all its assets.

It's our belief, that the missile, however, should be presented for what it really is – instead of what the sugar-coating makes it out to be.

SPECIAL REPORT

Polaris Fleet Ballistic Missile

HISTORY OF POLARIS PROGRAM

Sept 55: President approved decision to dvlp 1500-mi ballistic missile sys with nuclr warhead. Both land and sea bases considered.

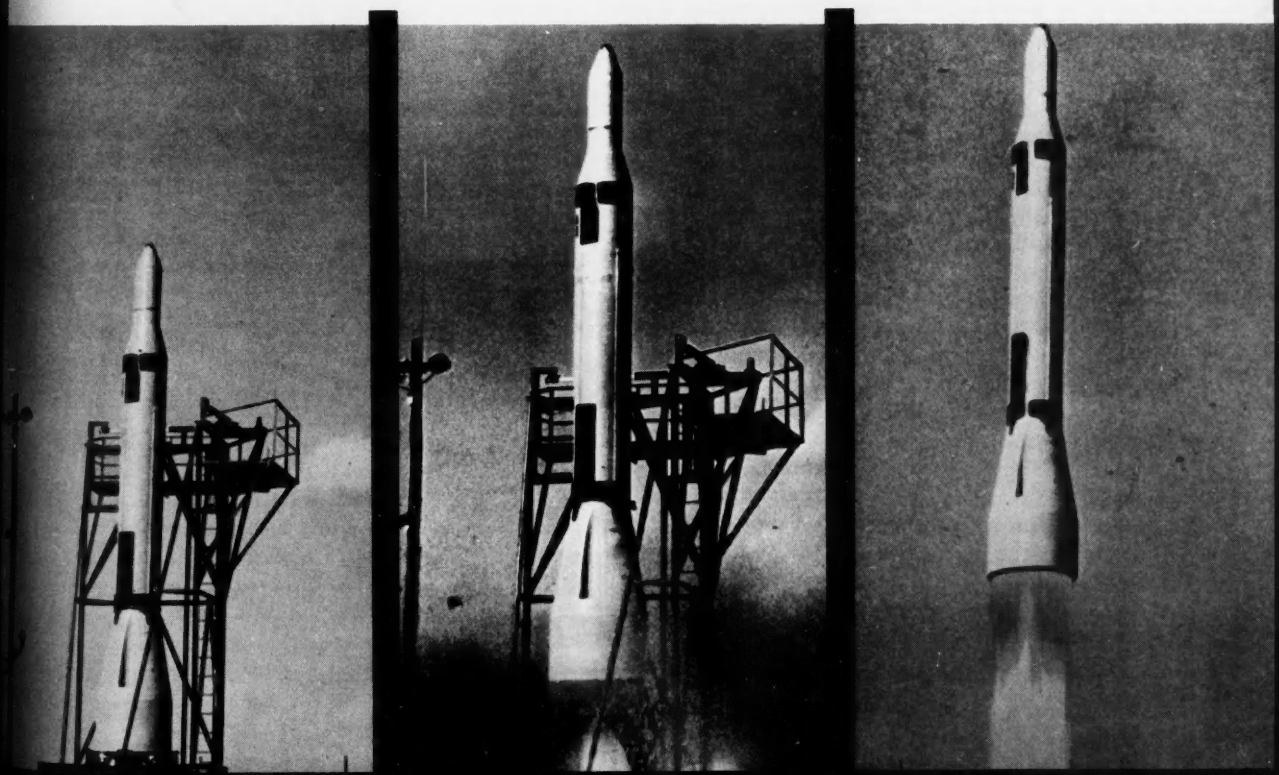
Nov 55: SecDef directed Army & Navy to proceed on IRBM program with dual objective of achieving shipboard capability and also providing land based alternative for AF IRBM program. Joint Army-Navy Ballistic Missile Committee was auth to carry out program in shortest time. This became joint Army-Navy JUPITER program. Special Projects Office was estab in Navy BuOrd to handle tech problems in assoc with ship-launch sys.

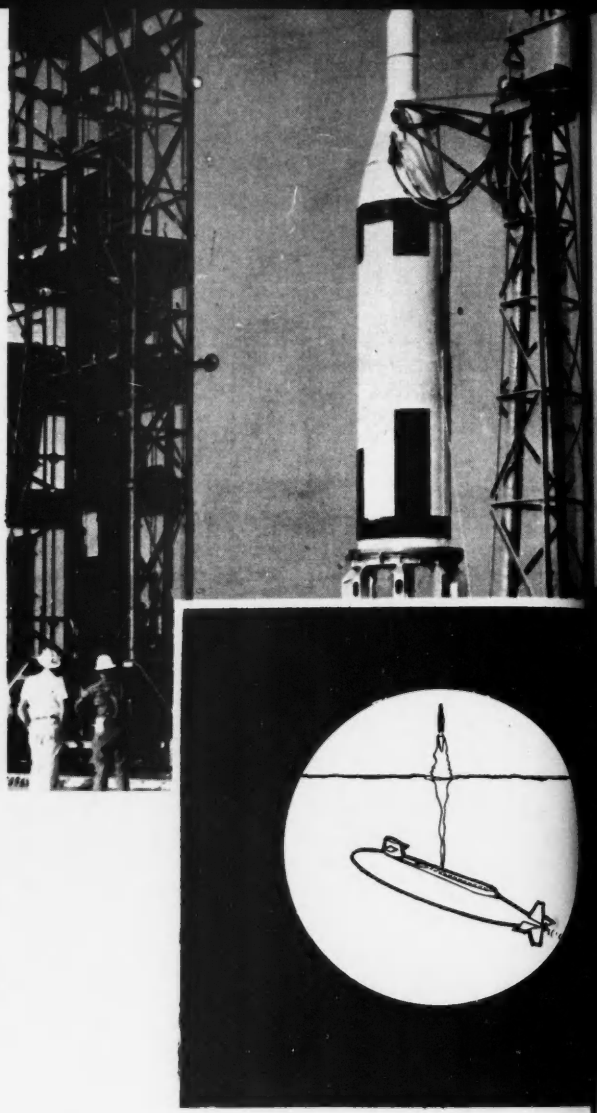
Nov 28, 55: Navy proposed to dvlp solid propellant motors for ship launch, looked for submarine use of missile. Navy said solids far and away better for sub use and solid fuel missiles should be part and parcel of undersea program.

Mar 56: OSD Ballistic Miss Committee approved Navy's parallel solid propellant program to determine weapon feasibility. JAN-BMC auth navigation dvlpmnt program tagged Mariner #1 and weap sys test & dvlpmnt progm called Mariner #2. Mariner #3, which was to be FBM ship for Fleet Eval, was cancelled. A FBM surface combatant dvlpmnt progm and the FBM submarine dvlpmnt programs were also brought into being at this time.

Dec 8, 56: SecDef auth Navy to terminate participation in liquid JUPITER program and to proceed with dvlpmnt of solid POLARIS. JAN-BMC was dissolved and SecNav formed Navy Ballistics Missile Committee (Nav-BMC) to direct program at highest priority. Special Proj Office, previously charged with dvlpmnt of sea-going application of JUPITER, was given added responsibility for dvlpmnt of entire FBM sys including POLARIS missile.

***The Polaris** in three stages of flight during the flight test program conducted at Cape Canaveral last June.*





The Polaris AX-1 test vehicle placed in its launcher prior to test firing. At the right is the umbilical tower from which cable are connected to the missile permitting ground checkouts prior to the launch. The access stand at the far left can be moved on tracks to surround the missile permitting technicians to work at various levels.

Jan 57: Special Proj (SP) organized new POLARIS Submarine Special Steering Group which led to estab of optimum FBM submarine dimensions. SecDef auth acceleration of "P" program to achieve completion of first sub sys POLARIS in 1960.

Jan 58: Navy called for further acceleration of POLARIS program, called for nine nuclear submarines with POLARIS capability by 1961.

GENERAL DESCRIPTION

POLARIS is a two stage solid propellant missile designed to be launched from submarines either surfaced or submerged. Launch can also be effected from surface ships or at shore bases. POLARIS is ejected from its sub launching tube by inert gases. Force of eject propels missile above water where missile motor begins operation for flight. After launch and during powered flight, POLARIS follows ballistic trajectory to range of appx 1200 miles. Primary means of launching POLARIS is from Fleet Ballistic Missile (FBM) submarines that are designed specially for this purpose and are capable of carrying POLARIS missiles. Submarine personnel can check and prepare missiles for firing while sub is submerged. The accuracy of POLARIS is expected to be good.

POLARIS PARTS & CONTRACTS

The complete assembly of POLARIS is under control of Lockheed Aircraft Corporation of Palo Alto, Calif.

Missile system:	Lockheed Missile Sys Sunnyvale, California
Propulsion:	Aerojet General Corp Sacramento, Calif.
Guidance dvlpmnt:	Mass Inst of Tech Cambridge, Mass
Guidance production & fire control:	General Electric Pittsfield, Mass.
Instrumentation (Prime):	Interstate Electronics Anaheim, California
Ship design:	Bureau of Ships
Ship navigation equip:	Various contractors, contact BuShips
Launcher (Prime):	Westinghouse Corp Sunnyvale, California
Warhead:	Atomic Energy Com.

Five nuclear submarines capable of launching POLARIS are presently under construction. They are the following:

SSB(N)-598 GEORGE WASHINGTON
General Dynamics constructing
SSB(N)-599 PATRICK HENRY
General Dynamics
SSB(N)-600 THEODORE ROOSEVELT
Naval Shipyard Mare Island
SSB(N)-601 ROBERT E. LEE
Newport News Shipyard
SSB(N)-602 ABRAHAM LINCOLN
Naval Shipyard, Portsmouth
SSB(N)-608 no name yet

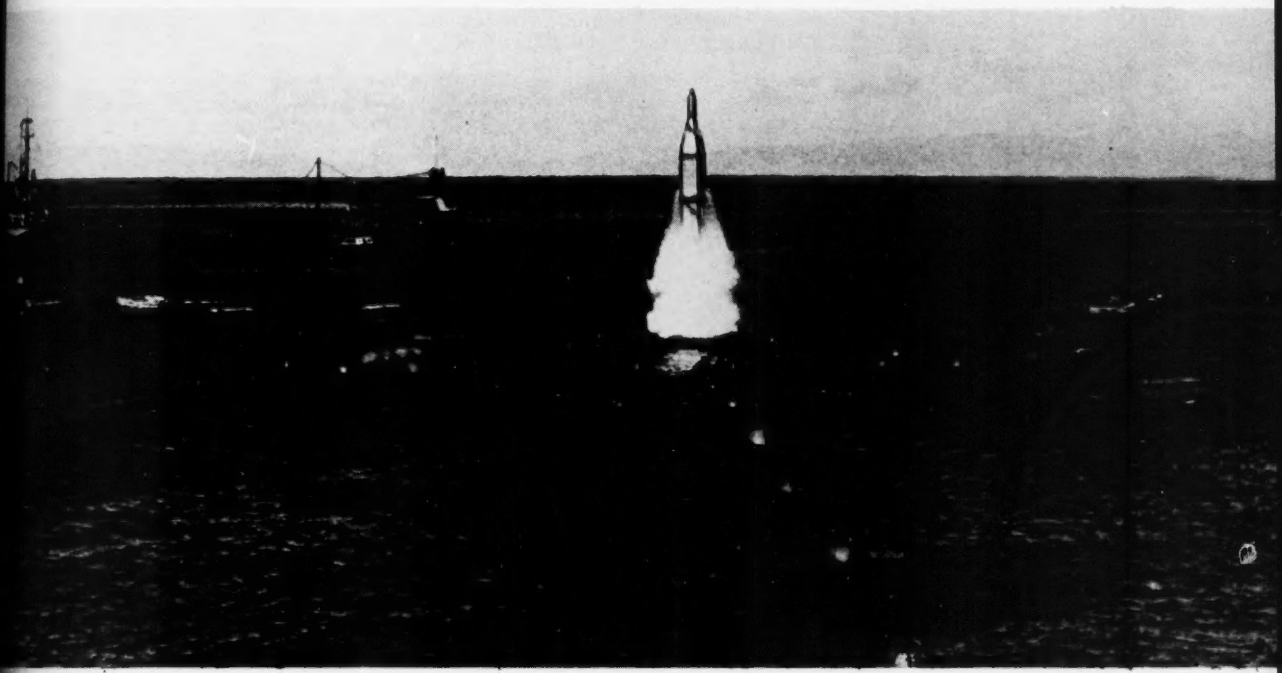
General Dynamics

Each of these submarines will hold 10 or more POLARIS missiles. The first group of POLARIS subs will be of the following dimensions:

Length:	380 ft
Width in beam:	30 ft
Disp. (light)	5400 tons
Disp. (submerged)	6700 tons

DATA. Since that time we have seen a Navy line drawing of submergible sub tender. Navy has refused comment.)

Missile assembly facilities to provide fleet facilities for receiving, assy, ck-out, stow & handling of POLARIS missiles will be done at Charleston, S. C. A special POLARIS-submarine training program is being planned.



A test vehicle clears the ocean surface seconds after leaving a launching tube housed in a stationary cylinder beneath the surface as part of the Navy's "Operation Pop-Up" test program.

SUPPORT PROGRAMS OUTLINE

An underwater launcher known as POP-UP has confirmed feasibility of underwater launches. A converted cargo ship — now the COMPASS ISLAND (EAG-153) — is used to develop accurate navigational equip for accurate shipboard use of an IRBM. Result to date is Navy's SHIP INERTIAL NAVIGATIONAL SYS. (SINS), which can position firing ship with hi-degree of accuracy. FBM Tender Program is designed to provide 1 tender conversion in FY 59 and 1 new construction tender in FY60. Further new construction tenders will be requested in future years accoding to SSB(N) auth in ratio of 1 tender for each 6 to 9 SSB(N).

(*EDITOR'S NOTE: Data Publications reported Navy plans for construction of underwater sub tenders in Nov 58 edition of

PRESENT DEVELOPMENT STATUS

POLARIS has progressed satisfactorily. On 14 Sept 58, a captive test of first stage and on 31 Oct 58 the captive test of second stage were completed satisfactorily. On 24 Sept 58 a test vehicle was launched but the vehicle failed to follow a safe program and was destroyed after 27 seconds. A second vehicle was unsuccessful because of failure of devices carried only in test missiles and which now require certain minor re-designs. Third and fourth test vehicles have shown continued improvement.

POLARIS BUDGET

In the FY 1960 budget SecDef has requested $611,568,000 of new obligational authority for POLARIS. This amount will provide for com-

pletion of funding for one new construction tender, advance procurement for 3 FBM subs to be included in FY 1961 Shipbuilding Program; missiles; continued missile dvlpmnt, R&D for command commun sys, operation of test ships, operation & construct of support facils, and training of personnel. On the submarine side, in Aug 58 funds were released to purchase long lead times for an additional 4 FBM boats. The total planned at this time, therefore, is one group of 9 boats — 5 in planned construction & 4 in the future with funds already allocated.

The first FBM sub is scheduled to be in operation by 1960. The other 4 additional subs of the initial lot of 5 are expected to be ready for sea by April 1961. The Navy believes 3 of the second group of 4 will be authorized for '61 and expects the FY 61 subs to be ready for sea in 1963.

In addition to the 9 subs now appropriated, the Navy plans to ask for 6 additional P-subs appropriations in FY 60 and 12 more authorizations in FY 61.

Each FBM sub costs about $100 million. This figure is, of course, less missiles.

EMPLOYMENT CONCEPT

FBM submarines will be organized into squadrons of about 9 boats. Each squadron will have a tender. Submarines will be assigned to those unified commanders exercising command of major naval forces and will be integrated into the existing Fleet organization. Assignment of submarines will be dependent on strategic requirements at time of delivery of ships. Submarines will be home ported in Continental US and will operate from tenders.

FIRING POLARIS IN COMBAT

POLARIS is a retaliatory weapon system. If the enemy were to launch an attack against the US, POLARIS submarines could immediately return the blow while cruising undetected in enemy waters.

COURTESY OF "FLIGHT"

MISSILES 1959

RELATIVE SIZE OF POLARIS TO OTHER MISSILES

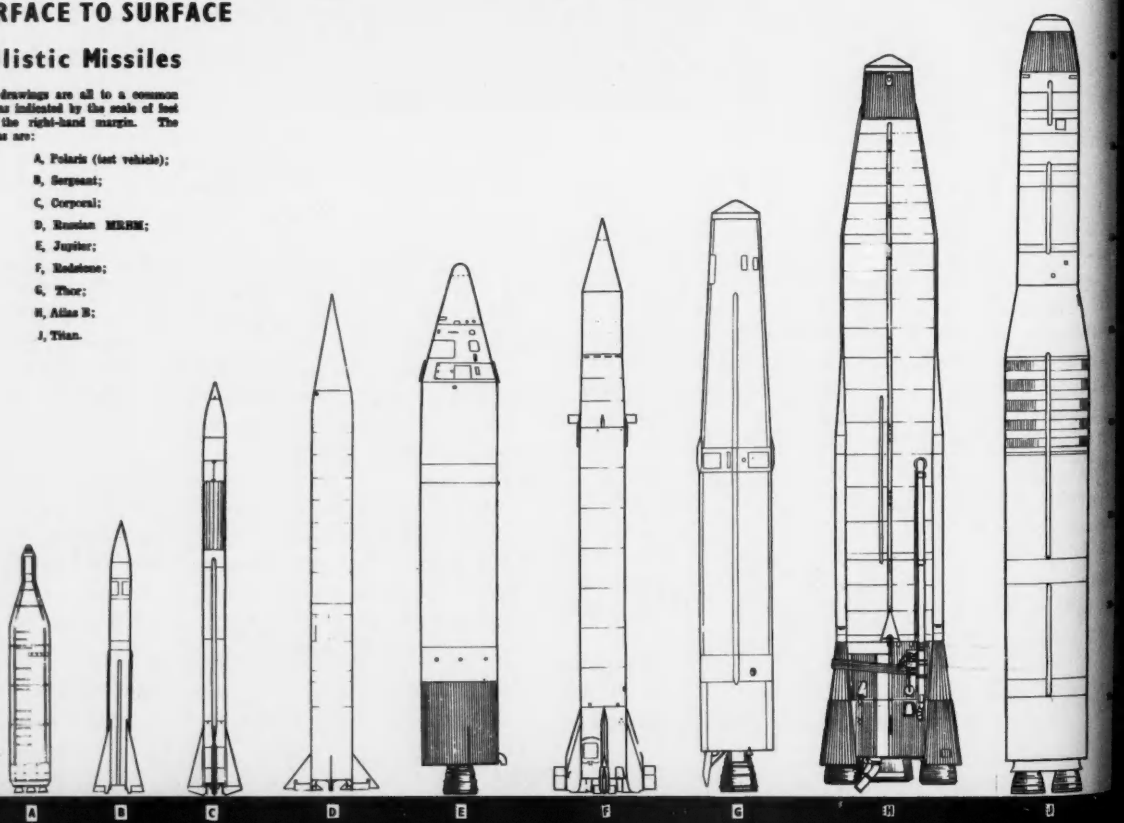
SURFACE TO SURFACE

Ballistic Missiles

These drawings are all to a common scale, as indicated by the scale of feet along the right-hand margin. The weapons are:

A, Polaris (test vehicle);
B, Sergeant;
C, Corporal;
D, Russian MRBM;
E, Jupiter;
F, Redstone;
G, Thor;
H, Atlas E;
J, Titan.

drawings by Arthur Bowbeer.



BUORD MERGES WITH BUAER, OTHER NAVY CHANGES IN R&D

Navy's Bureau of Ordnance will merge with Bureau of Aeronautics to form new Bureau of Naval Weapons. Position of Asst to SecNav for Pers & Reserve will be elim. Asst SecNav for R&D will be created. Report submitted to SecNav by committee headed by Wm Franke who is to be SecNav himself in June is sure of adoption. Report also recommended abolition of post of Asst Chief of Naval Ops R&D and assign of functions to newly created Dep Chief of Naval Ops for Dvlpmnt. New Dep would be charged with coordination of all research, dvlpmnt, test and eval programs. He would also take over Guided Missile Div now under Dep CNO for Air and assume task of scientific date collection and dvlpmnt coord now performed by ONR. ///Navy Info 0320/

SOVIET 2ND MOON SHOT MAY COME SOON; SECRET SPUTNIKS?

Rumor in Washington has it that Soviets will send second lunar probe to moon within next five weeks. This time probe will photo far side of moon. Another rumor, coming from Pentagon sources, says Reds have other satellites of military capabilities in orbit now which they have not announced to world. ///DATA/

BACKGROUND SHEET ON BERLIN PASSED TO MAJOR COMMANDS

Historical background of the Berlin occupation and the United States position under existing conditions are set forth in newly issued Dept Defense Fact Sheet 1-G, 'West Berlin: Free World Outpost.' The fact sheet is now being issued to major commands. ///Army Info Digest 3/

POLES AID CUPID

Polish Air Force said to be grounding unmarried pilots to thwart possible escape to the West. Communists encourage romance between pilots and local maidens to extent of use of official cars for dates.

///Pensacola GOSPORT 0320/

NEW MISSILE PROJECTS

Here are the new missile names that you will be hearing more about soon: Army REDEYE and MAULER, Navy EAGLE and ATLANTIS, AF BOLD ORION and WHITE LANCE. Watch for move underway by Army and Navy to replace part of strength by AF SAC. ///DATA/

POST OFFICE DEPT R&D WORK INCREASING, MISSILE INTEREST HIGH

The Post Office Dept recently awarded two contracts for R&D of mail sorting machines. One, valued at $726,778, went to Aerojet-General and the other, undisclosed amt, went to Food Machinery & Chem Corp. Post Office also dickering with Defense Dept over purchase of phased-out Chance Vought Navy REGULUS guided missiles to use in mail delivery. Modified REG I could deliver "missile mail" between NY and DC in 20 minutes, regardless of weather. ///DATA/

NASA CONTRACTS FOR FEBRUARY

NASA wrote $11,910,000 worth of R&D contracts for February. Largest was $10,500,000 contract with McDonnell A/C for Proj Mercury (man-in-space). Ultimately this proj is expected to cost about $15,000,000. Aerojet General rcvd $170,000 for Aerojet Senior boosters to be used in Proj Scout, the 4-stage all-solid propellant test vehicle to be ready in 1960. Minneapolis-Honeywell was awarded $770,000 for guidance system in Proj Scout. Smithsonian Inst rcvd $470,000 for electronic track and data reduction equip. ///NASA 0319/

NASA ASSIGNS CONTRACT FOR VEGA ROCKET ENGINE

NASA signed $5 million contract with G-E for dvlpmnt of liquid propellant engine to power second stage of VEGA space vehicle. Engine will be modified VANGUARD first stage. Combined with ATLAS as first stage, VEGA will be capable of carrying significant payloads on interplanetary missions. It will have payload capability of about 3 tons in earth satellite orbit. ///NASA 0324/

VENUS IN POSITION IN JUNE, PACK FOR MARS END OF SEPT

Next most favorable date for launching rocket to Venus is 8 June 1959. The next most favorable date for launching rocket to Mars is 1 Oct 1959. Launchings are not limited to these dates but launch velocity required increases with each day of postponement. One Congressman has reported he has info US will launch two shots to Venus in June. ///Rand Corp/

REDS SEE 21ST CENTURY BRINGING ARTIFICIAL LIFE

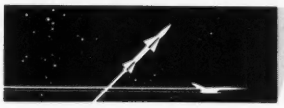
Leading Soviet scientists predicted recently that man in the 21st Century would be able to create life artificially, would have bloodless "supersonic" surgery and would need only one or two hours of sleep a night. The scientists, whose views were reported by the Soviet news agency Tass, said flights to the moon would be routine after the year 2000, and that earthmen would be busy exploiting the moon's natural resources. Soviet astronautics expert Yuri Khlebtsevich predicted that the next century pioneer would concentrate on reaching Saturn, Jupiter, Uranus and Pluto. Tass rcvd its info from reviewing new USSR book, "Report From the 21st Century," in which 29 prominent Soviet scientists gave their predictions on what mankind would accomplish in the next century. ///WP&TH A-3/

RUSSIAN TRANSLATIONS AVAILABLE

Compiled by Cent Intel Agency, Office of Tech Services in Commerce Dept is now making avail English translations of many Russian scientific works of recent vintage. SCIENTIFIC INFO REPORT, semimonthly general review of current Soviet scientific dvlpmnts, is avail thru OTS Dept of Commerce, Wash 25, at $28/yr. ///Commerce Dept/

EXPIDITING R&D IS OBJ OF ARMY REG 705-5

Dept Army Reg 705-5 cuts lead time — period of time between conception of idea and production of hardware. New reg describes measures to cut, explains dvlpmnt cycle, desirability of std parts in R&D equip. Ask for Army Reg #705-5 from Army Press, 2E761, Pentagon. ///Army Press/



ARMY CURRENT ROCKET RESPONSIBILITIES

ABMA (Army Ballistic Missile Agency): JUPITER, REDSTONE, PERSHING, ARPA Project SATURN, NASA Projects.
ARGMA (Army Rocket & Guided Missile Agency): CORPORAL, SERGEANT, HONEST JOHN, LITTLE JOHN, target missiles, LACROSSE, HAWK, NIKE-AJAX, NIKE-HERCULES, NIKE-ZEUS, PLATO, REDEYE, LOBBER.

ARMY REDEYE TO BE LIGHTWEIGHT INFRARED GROUND-TO-AIR

Similar to Navy's SIDEWINDER in search guidance and low-cost construct, Army's new ground-to-air REDEYE will be dvlpd for use against low-flying planes & 'copters. ///Army Info 0324/

WHITE LANCE

Dvlpd from BULLPUP, WHITE LANCE has same general config with improved guidance & propulsion, and different warhead. WHITE LANCE, when operational, will have control from pilot's cockpit. ///Mil Review/

WS-138A AIR-TO-SURFACE MISSILE

In conjunction with AF's BOLD ORION proj, WS-138A is air-to-surface bird now being negotiated by AMC. According to Electronic News, 20 firms bid on WS-138A, no announcement of contract yet. ///Electronic News 0320/

A-PLANE AIRFRAME TO BE BUILT BY CONVAIR

AF has given nod to Convair's proposal for nuclr a/c config. Lockheed had been in running. G-E will build nuclr powerplant. Contract was released by AF 20 March. ///AF Info 0320/

'DUNCE CAP' NOSE CONE BEING TESTED BY USAF

New type nose cone is being tested on both THOR-ABLE and ATLAS. Tagged "dunce cap", cone has flaking action wherein the outer layer of cone flakes off from re-entry friction leaving inner cone protected. //AF/

CHANCE VOUGHT DIVERSIFIES, LOOKS FOR NEW PRODUCTS

Big push underway in Chance Vought Aircraft is to get more commercial markets, less dependency on military contracts. After losing two big ones, cancellations of CRUSADER all-weather fighter and REGULUS II missile, company began diversification push. House paper, called Vanguard, asks CVA employees to come up with ideas for other products CVA can make. Chance Vought already pushing into commercial market by making seats for club compartments of new Convair 880 jet airliners. ///Chance Vought/

SPARROW III FACT SHEET RELEASED BY NAVY

Navy has hi hopes for air-to-air SPARROW III. Raytheon-built missile is said to have warhead with 50% more explosive force than other Navy air birds, guidance is superior too, allows more leeway for pilot aiming. New SPARROW III now operational on MIDWAY & BON HOMME RICH. ///Nav/

NAVY AWARDS SOUTH PACIFIC TRACK PLAN CONTRACT

Aeronutronic Systems, Inc., a subsidiary of Ford Motor Co., Glendale, Calif., has been awarded instrumentation planning contract for Pacific Missile Range. The contract award calls for a six-month study. Cook Research Laboratories, Dunlap Assoc, Eastman Kodak and Page Comm. Engrs will carry out project with Aeronutronics. A survey will be made of requirements for range instrumentation equip for new Pacific Missile Range. ///Navy Info 0320/

MOBILE MULTI-CHANNEL RADIO SET DVLPD FOR ARMY USE

Announced 5 March, new set built by Westinghouse for Army is one-third smaller and only half the wt of field equip currently performing similar function. Designated AN/GRC-53, equip is housed in standard Army shelter mounted on 3/4 ton truck and provides 400 radio freq channels in the band of 50 to 150 megacycles. Twenty-four persons can use system simultaneously with interference. ///Army SigC 04-59/

DEFENSE DEPT STRENGTHENS PROGRAM ON QUALITY CONTROL

New DOD policies on quality control are reflected in DOD Inst 4155.10. Under Inst 4155.10 inspection agencies of DOD have prime responsibility of monitoring contractors' quality control operations. Copies of the new instruction are available from Office of SecDef Pub Affairs - Press, Rm. 2E761, Pentagon. ///Army Info 0312/

NEW RADIO TUBE DESIGN

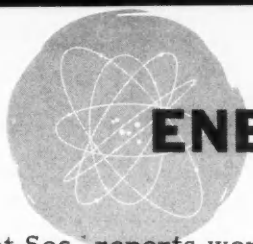
Army announces new dvlpmnt in tube design. New tubes glow blue instead of red and use less than 1/10th power of old style cathode tubes. Future uses include radio & TV as well as military assignments. Because of extreme resiliency to heat & atomic radiation, tubes will be boon to installs such as missile dvlpmnt bases. ///Army Info 0224/

FAILURE OF AN/SPS-10 RADAR ANTENNAS REPORTED IN DESLANT

According to Destroyerman, official pub of Destroyer Force Atlantic Fleet, several reports of failure of AN/SPS-10 radar antennas have been rcvd. Failures are a result of malfuntioning of lubrication system in antenna pedestal. Operation of antenna with lube will permanently damage gear trains. Seems that better self-lubricating antenna would be desirable in DesLant. ///Destroyerman 02-10/

'BRAIN' USES 107 WORDS TO DIRECT OTHER ROBOTS

Top AF science leaders announce signif electron breakthru in form of 'mechanical brain language' called APT, Automatically Programmed Tools. APT allows master elec brain to design and supervise other manless machine's production. Before APT, tech personnel had to spend hundreds of hrs planning even the simplest work for an automatic machine. ///USAF Info 0226/



ENERGY

EXPLODING WIRE PROPULSION

Astronuatics magazine, official pub of Am Rocket Soc, reports work by USAF Cambridge Research Center on little-known 'exploding-wire' phenomenon may estab new approach to prob of spacecraft propulsion and possibly to controlled nuclr fusion itself. By discharging enormous currents thru tiny wires, the wires can be made to vaporize into plasma of 50,000 K or more. This plasma could be directed by an external magnetic field to produce thrust for propulstion. ///Astro 01-6/

RUSSIANS CLAIM TINY A-PLANT

The newspaper Soviet Aviation reported 11 March that the Soviet Union has produced a portable nuclear power plant the size of a safety match-box. The USSR paper said the tiny atom power unit had 400 volts power and was suitable for jobs requiring high voltage and low amperage.

ARGUS TESTS SHOW ONE TYPE MISSILE DEFENSE

Recently publicized hi-alt atomic energy tests show one type missile defense US has. Theory is atomic blast in general area of approaching enemy ICBMs would destroy enemy missiles. ///Defense Inf 0320/

AEROJET GETS POWERPLANT CONTRACT ON MINUTEMAN

Aerojet-General has rcvd $85 million contract for R&D in all three stages of MINUTEMAN solid-fueled ICBM. Boeing is prime contractor on assy & test. Other contractors include Thiokol and Hercules Powder on allthree propulsion stages, Autonetics Div of NAA on guidance & control, AVCO for nose cone, Space Tech Lab on systems engineering.
///Aerojet 0323/

TINY GAS TURBINE ENGINE BUILT BY SOLAR

Solar 'Titan', which bears the mil desig of YT-12, is said to be smallest gas turboshaft engine ever built. Only 20 in high with max diameter of less than 16 in, 'Titan' will produce 55 shaft hp plus 12 lbs of jet thrust. Designed for use in powering one-man 'copter, engine can op on standard military fuels. ///Solar/

GOODYEAR GETS $50,000 R&D BID ON ISOTOPES

Thru program to promote use of radioactive isotopes by Am industry, the office of Isotopes Dvlpmnt of AEC has awarded Goodyear Tire & Rubber a $50,000 R&D contract. Goodyear will undertake dvlpmnt of an isotope dating technique. ///Goodyear 0304/

A-BOMBS BRING STORMY WEATHER, REDS SAY

According to findings of Soviet lunar rocket, nuclr weapon tests are affecting weather. Nuclear explosions are shifting course of northern lights southward. US scientists do not agree with Soviet theories, do not believe USSR Atomic Reactions on Weather reports. ///AP 0308/

SHIPS

NAVY LAUNCHES NEW HI-SPEED RESEARCH CRAFT

24-ft boat with speeds to reach 60 knts will be launched in April. "Super-cavitating prop & hydrofoils" are features of fast craft. Super-cavitating propeller looks like wood screw. Super-cavitating hydrofoils create vapor cavity on top of foils, result in greatly multiplied speed. Craft will serve as test vehicle for uses ranging from logistic transport to anti-sub warfare. G-E T-58 turboshaft engine will power. ///Navy Info 0219/

AMPHIB CARGO BARGE, BARC, BEING TESTED BY ARMY TRECOM

Despite tremendous size of 62-ft length and 100 tons empty wt, BARC moves easily over soft sand and sharp coral with payloads up to 100 tons. Paper honeycomb fenders fore and aft reduce impact when BARC drops 26 ft into water from std Maritime Admin vessels. Tires 9 ft hi roll easily over all land surfaces. BARC is at home on land or sea. ///Army Trans 0320/

NAVY AWARDS $10 MILLION FOR TRANSPORT CONVERSION

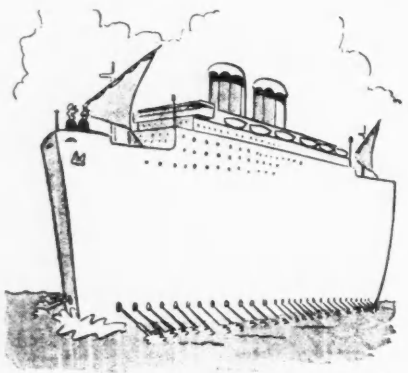
$10,366,000 contract has been awarded to Bethlehem Steel of Baltimore for conversion of PRAIRIE MARINER to an attack transport. Converted ship will have facilities for combat troops & vehicles. When completed at end of 1960, PRAIRIE MARINER will be renamed FRANCIS MARION (APA-249). Contract was awarded by Navy BuShips. ///Navy Info 0226/

ENGINEER DREDGE TO SUEZ

Giant sea-going dredge ESSAYONS of Army Eng Cor has been leased to Suez Canal Auth in UAR for essential channel dredging. ESSAYONS is 22,000 ton disp vessel capable of moving more than million cubic yards of material a month. Dredging mission in UAR will take 6 mos. ///Army/

NAVY ANNOUNCES CONSTRUCT AWARDS FOR 6 NUCL SUBS

Six more subs of THRESHER (SSN-593) class, which is now being built at Portsmouth Naval Shipyard, are to be built. New York Shipbuilding in Camden will build 2 of subs for $45,389,098. Ingalls Shipbuilding, Pascagoula, Miss., will build 2 more of subs for $49,178,142. Portsmouth will build 1 at undisclosed price and Mare Island will construct 6th sub also at undisclosed figure. Navy release noted that subs were contracted on competitive bidding, says 5 private shipyards were contacted and all 5 responded with proposals. ///Nav 0305/



"Ike's new 'economy' budget sure caught the shipyard by surprise."

THE NMU PILOT — FEBRUARY 12, 1959

SOVIET SUB SIGHTINGS INCREASE

Washington on-Hill budget equation says, "Soviet sub sightings increase in direct proportion to Navy's desire for budget increase." Rule holding true of late. ///DATA/

CRUDESPAC TESTS DASH FISH DROPS

R/Adm W R Smedburg, Commander Cruiser & Destroyers Pacific Fleet, has been conducting high successful, Destroyer-based Anti-Submarine Helicopter torpedo drop tests, according to the Destroyerman Feb 59 issue, official pub of DesLant. Favored helicopter seems to be Republic Aviation's French-designed ALOUETTE II.

///Destroyerman 02-3/

BUORD CONTRACTS FOR NEW ANTI SUB ROCKET: ASROC

ASROC is superior anti-submarine missile designed for launching from surface ships, now under dvlpmnt at Minneapolis-Honeywell, Durate, Calif., under contract. Technical direction of project assigned to Naval Ordnance Test Station, Pasadena and China Lake, Calif.

///DesLant 03-2/

SUBROC

Highly classified submarine or surface-ship surface or underwater to underwater rocket. Technically termed 'an underwater guided missile' the solid propellant SUBROC will be weapons system managed by Goodyear, motored by Thiokol. SUBROC system can detect submarine at long range, compute course and speed, and fire missile from submerged or surfaced position. Goodyear working with Naval Ordnance Lab on project. ///DATA/

NAVY ANTI-SUB R&D $132 MILLION FOR '60

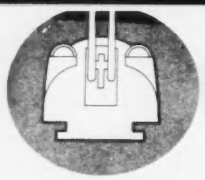
R&D work in anti-sub warfare will account for some $132 million of Navy funds in FY 1960 says R/Adm John T Hayward, asst chief of Naval Ops for R&D. Many firms pushing private R&D projs, Hayward said, and these are welcomed by Navy. ///Navy Info 0320/

BOSTON ELECTRONIC MFGRS IN TIGHT-LIPPED ANTI-SUB WORK

Raytheon, Sylvania, Infrared Industries and other Boston-area mfgrs are busy in Navy submarine work - but they're not talking. It is well known that Raytheon and Sanders Assoc of Waltham are working on sonar and sonobuoy equip, but no releases have been made from the Navy. Baird-Atomic and Infrared Industries are engaged in ASW infared work but have declined to comment on the basis of Navy-imposed security. Sylvania is more than likely working on the Navy's highly classified 'Sniffer Gear' which seeks submarines thru the ionic disturbances they leave behind from their conventional or atomic exhaust. Sniffer Gear was first reported by DATA in June 1958 DATA. ///DATA/

HOFFMAN AND LIBRASCOPE MAKING ASW EQUIP

Hoffman Labs has $1,500,000 contract with Navy to dvlp SSQ-23 sonobuoy. Dropped from a/c, sonobuoys transmit sonar info by radio back to sub-searching plane. Librascope is dvlping digital undrwtr fire control sys for anti-sub ops. ///Elec News 0314/



RDNANCE

ARMY QM DVLPS NEW MISSILE-SUPPORT VEHICLE

Expermntl multi-purpose vehicle designed by Army Quartermaster is now being eval for NIKE install. Named TELEFORK by Clark Equip Co who made it, vehicle serves as forklift, tractor and crane. TELEFORK can lift 10,000 lbs as forklift, pull 19,000 as tractor and handle 10,000 lbs with its slewing crane boom. ///Army QM 0319/

ELECTRIC POWERED FIREFIGHTER

First application of electric-powered pumps to a firefighting vehicle has been made by Corps of Engineers at Ft Belvoir. Self-operating pumper trailer has been dvlpd by Firefighting Branch of ERDL, Belvoir. For use at NIKE installations, unit is powered by two elec pumps, each with capacity of 50 gal/min at pressure of 100 lbs/sq in. Decontamination shower for pers part of unit. ///Army Eng 0225/

ALUMINUM PERSONEL CARRIER TESTED

Army's new aluminum armored personnel carrier, the T113E2, is under test in several Army installations. T113E2 weighs less than half as much as M59 personnel carrier which it will replace, and has considerably lower silhouette. The vehicle can carry a squad of infantrymen across rivers and rough terrain, and can be airlifted and parachuted. ///Mil Progress/

NEW FAMILY OF TRUCKS DVLPD FOR ARMY

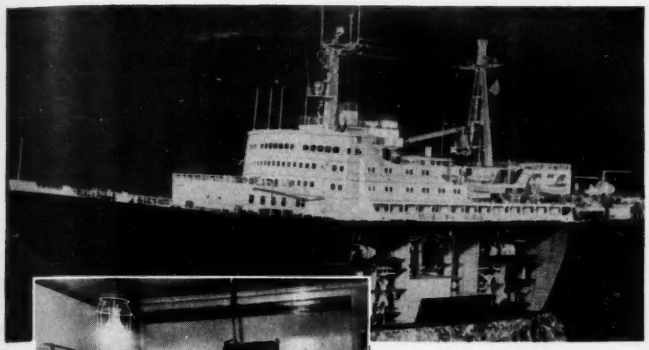
Chrysler has R & D contract to dvlp new Army trucks. First of family the XM410, has been delivered for tests at Aberdeen. XM410 uses aluminum frame. Truck will float even when loaded. All eight wheels receive power. Although the size of std $2\frac{1}{2}$ ton truck, XM410 weighs 5000 lbs less, gets 50% more fuel milage. Special engine can burn gas, kerosene or diesel fuel. ///Army Info 0228/

FOXHOLE COVER

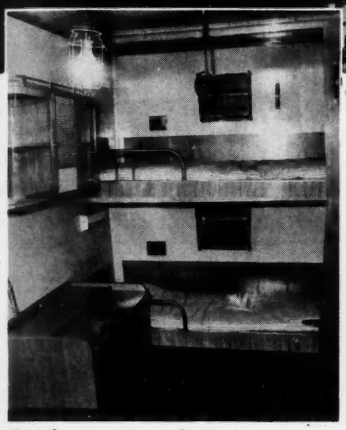
A multipurpose foxhole cover is under test and development at Marine Corps Landing Force Dvlpmnt Cntr. The cover, of which only a pilot model has been made, is 36 in long, 26 in wide, 10-3/8 in hi. It is constructed of fiberglass limination with ballistic properties similar to Doron plates used in Marine Corps armored vest. Weighing about 18 lbs each, two of the covers can be connected for use in supply ops or casualty eva. ///USMX 0310/

LIGHTWEIGHT LITTER

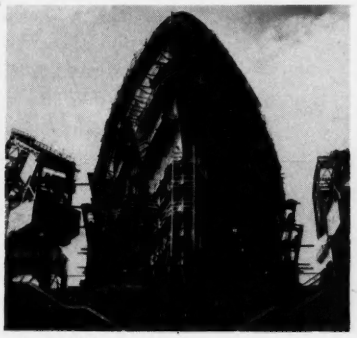
Lightweight litter carried in folded package by med corpsmen while on patrol is currently under test. Telescoping sections of aluminum tubing make up litter frame while neoprene-coated nylon is suspended hammock-style from outriggers. Wt: $4\frac{1}{2}$ lbs. Folds to package 1/3 cu ft. ///Mil Review/



The Soviet Atomic Icebreaker, **LENIN**, is now cruising in Soviet polar waters (displacement: 16,000 tons – aggregate capacity of main engines: 44,000 horsepower). The ship is equipped with a movie theatre, large library, music chamber, and well-equipped medical wards. Operation of the automatic atomic power unit on the **LENIN** is said to be carried out by engineers on duty at control pannels. A helicopter landing platform is also provided.



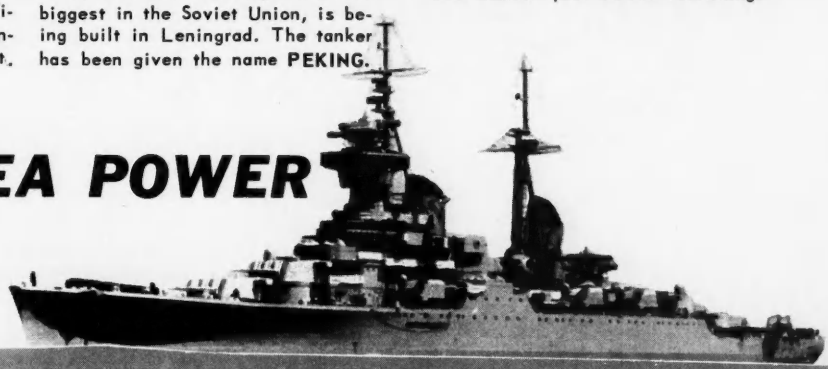
Crew's quarters of atomic powered **LENIN** serve two men; most officers have private rooms. Air conditioning is provided throughout.



A 40,000 ton oil tanker, one of the biggest in the Soviet Union, is being built in Leningrad. The tanker has been given the name **PEKING**.

The **LENIN** just before launching.

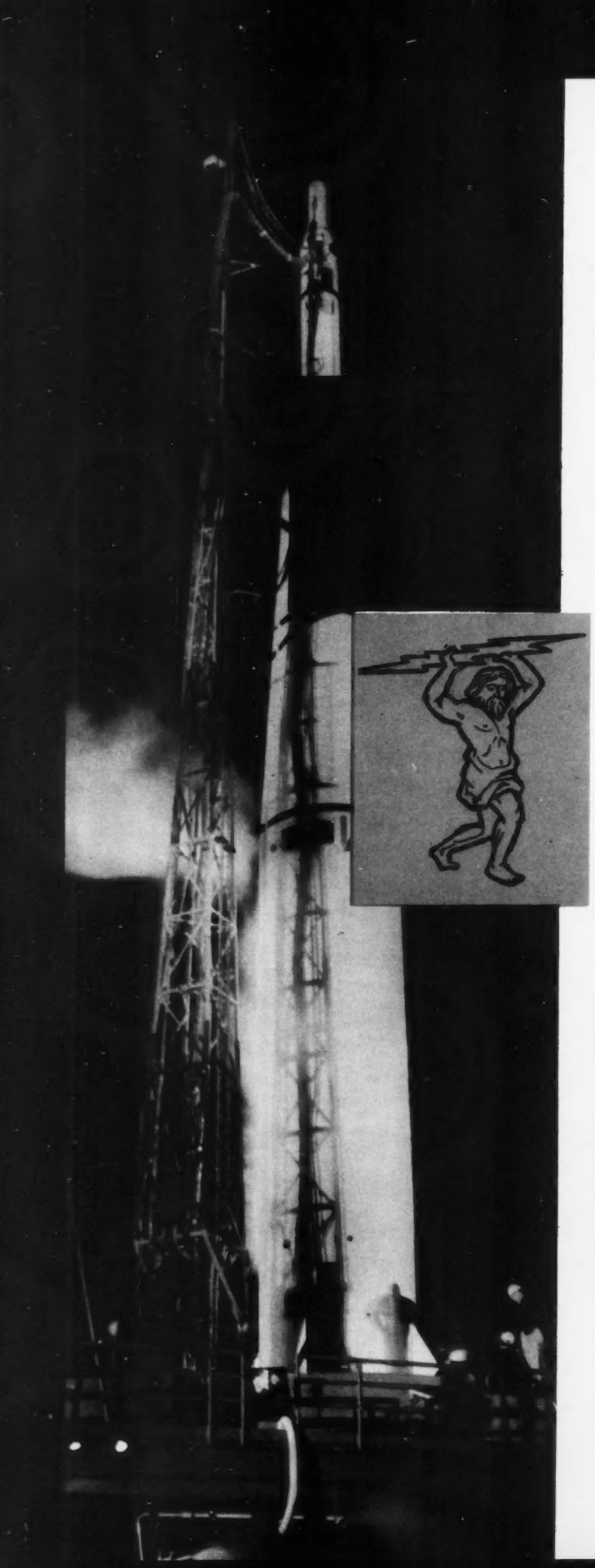
SOVIET SEA POWER



The cruiser, **SVERDOLOV**, was among the Soviet Baltic Fleet Ships which sailed to Britain recently.

Shown on this page are some recent Soviet ship photographs released to DATA by the Russian Naval Attache in Washington. To the best of our knowledge and the Soviet Naval Attache, they have never before been printed in the United States. We hope to present more of this type material in subsequent issues.

Soviet Destroyers *OZHESTOCHONNY* and *OTVETSTVENNY* tied up in *USSR* waters. Note similarity of range finders and radar antenna to those of US ships.



One of the most important, yet unheralded, missile research and development programs has been under way for many months at Cape Canaveral Test Annex of the Air Force Missile Test Center in Florida. This is THOR-ABLE PHASE II, the fourth in the series of Thor IRBM developments, which again only illustrates the tremendous versatility of the Douglas-built, Rocketdyne-powered missile.

First in the series, of course, is the Thor IRBM, a weapon criticized for its short-sighted military role almost from its inception. In the U.S. armed forces scheme, the Thor (as well as the Jupiter) were military monstrosities, dependent because of their limited range upon overseas bases, subject to massive attack by waves of Russian fighter planes, Russian IRBM's, and, most critical of all, reliance upon a World War I-style logistics system. Finally, the logic of it all became too great to ignore, and the U.S. has abandoned its programs for employing on any major scale either of these two powerful rockets.

THORA

But as a research tool and space booster, the Thor is a singularly spectacular success. First evidence of its new and constantly increasing role came in the form of the Thor Able Phase I series, the combination of Thor and the second stage from the ill-fated Vanguard program. This combination vehicle set new records for the U.S. missile industry, most notably in its nose-cone testing program, which saw the lofting of a nose-cone from Canaveral more than 6,600 miles down range. Out of the first three shots, two were completely successful – an admirable record for all concerned.

Then came the third variant – the Air Force Lunar Probe, which mated the Thor Able Phase I with a third upper stage, atop which – for a fourth-stage – went the Pioneer payload, vernier rockets, et al. Again success was high with the Thor-Able system. The first probe exploded 77 seconds after launching, but on the second and third shots, the Thor and its second stage functioned perfectly.

Few people noticed the numbers of the Thors as-

Thor Able *being readied for launching at the Air Force Missile test Center Patrick Air Force Base, Florida.*

BY MARTIN CAIDIN

RABLE PHASE II?

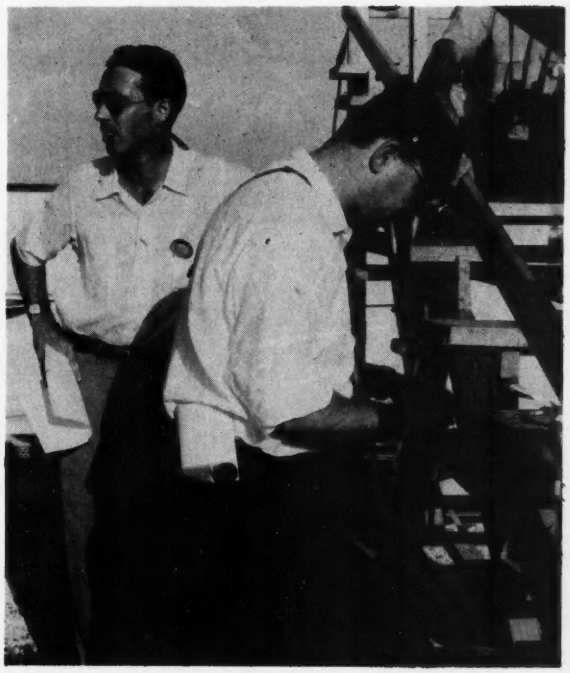
signed to these test series. The first moon shot was made with *Thor 127*, the second with *Thor 130*, the third with *Thor 129*. What happened to *Thor 128*? It wasn't expended in ground testing, for *No. 128* made its way to Cape Canaveral, and then mysteriously disappeared. An inquisitive soul could dig deeply and come up with vague reports of a Thor Able PHASE II. What was it? The answer was not so startling as it should have been obvious – the Air Force's "interim ICBM."

A Thor-Able as an ICBM? Well, why not? You don't have to steal military secrets to learn what is obvious by extrapolation. Take a look at the third lunar shot. The Thor-Able system boosted a package containing the unfired third stage, the Pioneer payload, and all the accompanying paraphernalia.... heat shield, explosive bolts, and so forth. Total weight: between 500 and 600 pounds. This weight was hurled over a distance of 7,500 miles, with a Brenschluss of the second stage of approximately 16,000 MPH.

Any vehicle that hurls a 500 pound package over a distance of 7,500 miles in a ballistic trajectory is a hell of a weapon. The Thor guidance system, coupled with that available in the combined Thor-Able system, is extremely effective. Using normal fuels, then, the Air Force suddenly had a vehicle which literally was an ICBM – in existence, with many proven flights behind it! Not something which could be developed into an ICBM – but an existing, on-the-shelf item. The realization was most significant.

An atomic bomb can be packaged into a typewriter case, or a lot smaller. Take the size of the Polaris warhead; within a space of three feet in length and one foot in diameter, we have a warhead yield of approximately one megaton. At the least, then, a Thor-Able of the third lunar probe configuration promised a weapon over 5,000 miles range of this power yield. Then, what if an extra kick was added atop the Thor-Able second stage – to make it a PHASE II vehicle? This promised delivery over 6000 miles, or more, of a heavier payload than could be carried by even the Polaris over 1,500 miles!

Such a vehicle exists – *Thor 128* was an actual test, fired on January 22nd, 1959, from Pad 17A of Cape Canaveral, of a special system. Three stages or two? Nothing definite in terms of *powered* stages, but definitely three stages, and with a nose-cone. The third stage, as seen from its size, could accommodate the nose-cone to resist friction back through the atmosphere, the warhead, and final-stage guidance system to assure better descent control into the target – something no one in the military wants to talk about. Yet this is a key element in our ballistic missiles accuracy – control of the warhead in its final plunge. A degree or two means the difference between a near miss or a direct strike, and this is nothing new in the way of terminal guidance – after all, the Redstone was designed for this as far back as 1951!



Editor Caidin *gathers "on the spot" Cape Canaveral data.*

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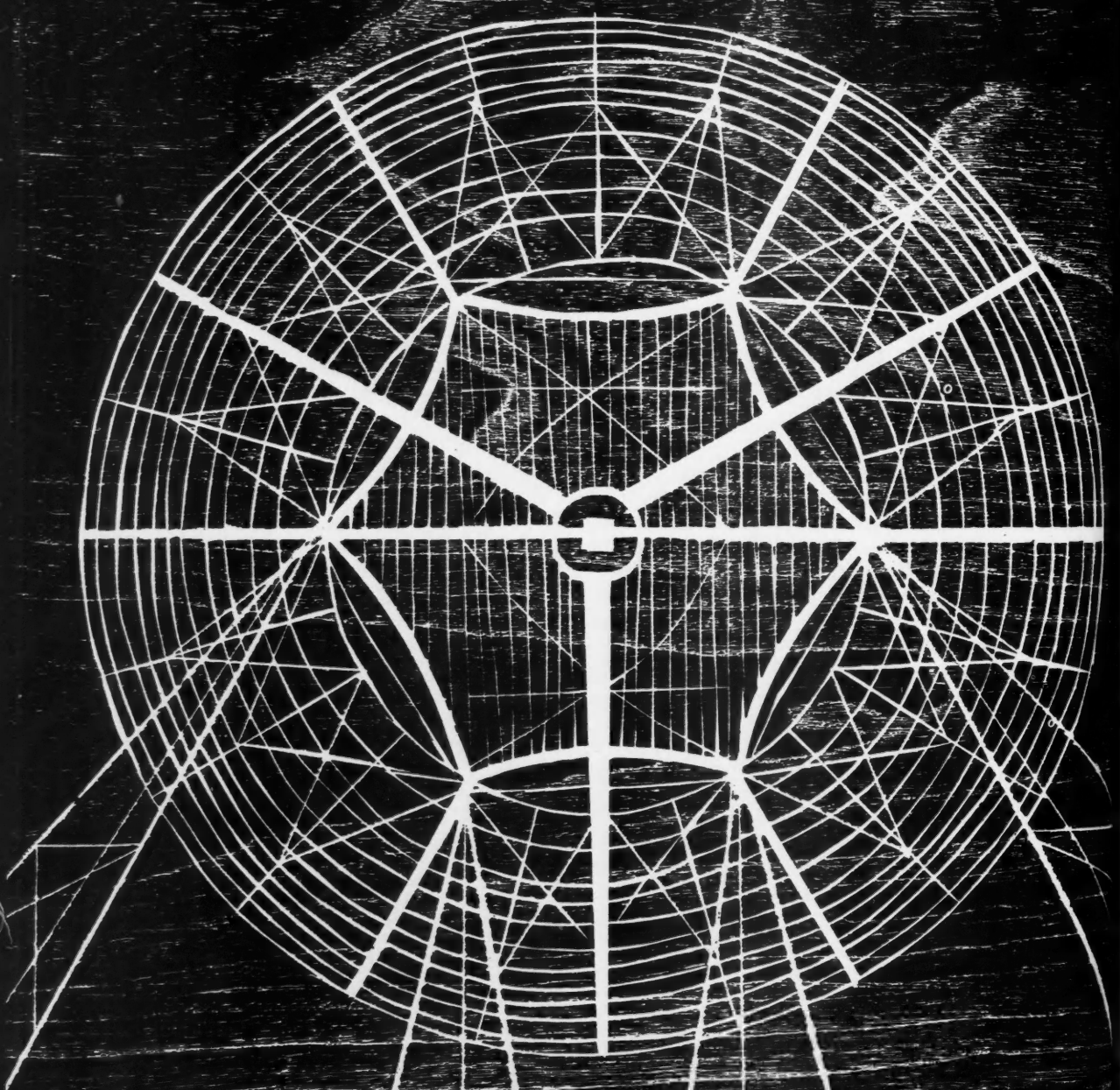

THE MANAGEMENT MAGAZINE OF TECHNICAL PROGR

ur responsibility!

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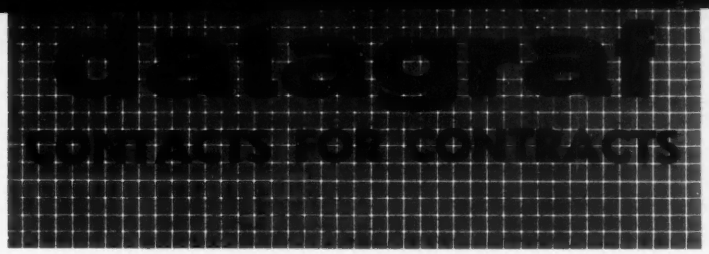

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